UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,587	07/03/2003	Abhijit G. Shanbhag	M-15227 US	7678

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EXAMINER
WILLIAMS, LAWRENCE B

ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

	Application No.	Applicant(s)
Office Action Summary	10/614,587	SHANBHAG ET AL.
	Examiner	Art Unit
	Lawrence B. Williams	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>24 January 2007</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) <u>1-16</u> is/are allowed.

6)☒ Claim(s) <u>17-20</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) <u>21-45</u> are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>03 July 2003</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒	Notice of References Cited (PTO-892)		4)☐	Interview Summary (PTO-413)
2)☐	Notice of Draftsperson's Patent Drawing Review (PTO-948)			Paper No(s)/Mail Date. _____ .
3)☐	Information Disclosure Statement(s) (PTO/SB/08)		5)☐	Notice of Informal Patent Application
	Paper No(s)/Mail Date _____ .		6)☐	Other: _____ .

DETAILED ACTION

Election/Restrictions

1.   Applicant's election without traverse of claims 1-20 in the reply filed on 24 January 2007 is acknowledged. The examiner suggests applicant submit in the next response an amendment with non-elected claims having the proper status identifier. For any amendment being filed in response to a restriction or election of species requirement and any subsequent amendment, any claims which are non-elected must have the status identifier (withdrawn). Any non-elected claims which are being amended must have either the status identifier (withdrawn) or (withdrawn-currently amended) and the text of the non-elected claims must be presented with markings to indicate the changes. Any non-elected claims that are being canceled must have the status identifier (canceled).

Drawings

2.   This application has been filed with informal drawings, which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Specification

3.   The disclosure is objected to because of the following informalities: The examiner suggest applicant fill in missing information in line 8 of page 18.

Appropriate correction is required.

4.   The specification has not been checked to the extent necessary to determine the presence

of all possible minor errors. Applicant's cooperation is requested in correcting any errors of

which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on
> sale in this country, more than one year prior to the date of application for patent in the United States.

6.   Claims 17 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Ghosh US

Patent 6,011,813).

(1) With regard to claim 17, Ghosh discloses in Fig. 2, an equalizer comprising: means

for receiving a first input signal (210) and providing an equalized output signal; means for

receiving (280) the first input signal and providing tap coefficients to the means for providing the

equalized output signal (col. 5, lines 47-50; col. 6, lines 4-6); a slicer (230) adapted to receive a

slicer input signal (225) and provide a slicer output signal (175); means (280) for generating an

error signal based on the slicer output signal; means (240) for generating a feedback signal (245),

which is summed (220) with the equalized output signal (215) to generate the slicer input signal;

and means (280) for generating a mean square error signal based on the error signal (col. 6, lines

4-25).

(2) With regard to claim 19, Ghosh also discloses in Fig(s). 4 and 5, the equalizer of

claim 17, wherein the equalizer is employed to determine at least one of a bandwidth estimate, a

channel identification estimate, a signal-to-noise ratio estimate, a chromatic dispersion estimate,

and a polarization mode dispersion estimate for a communication channel associated with the

equalizer. Ghosh discloses in Fig. 4, the equalizer employed to determine a signal-to-noise ratio

(col. 8, lines 49-56) and in Fig. 5, a noise variance (col. 9, lines 36-44) for a channel associated

with the equalizer.

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

8.   Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh (US

Patent 6,011,813) as applied to claim 17 above, in view of Koyama (US 2002/0006160 A1) and

further in view of Garret (US 2004/0001538 A1).

As noted above, Ghosh discloses all limitations of claim 17, above. Ghosh does not

disclose the equalizer of claim 17, further comprising means for storing the tap coefficients and

the mean square error signal.

However, Koyama discloses an equalizer (Fig. 12) wherein he discloses means (Fig. 2,

element 506) for storing the tap coefficients (pg. 6, paragraph [0068]).

It would have been obvious to one skilled in the art at the time of invention to incorporate

the teachings of Koyama to incorporate a method of updating tap coefficients, which would

reduce power consumption.

Neither of the cited references teaches means for storing the mean square error signal. However, Garret discloses an equalizer wherein he teaches means (Fig. 5, element 58) for storing a mean square error signal (pg. 3, paragraph [0031]).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Garret as a method of implementing a faster error convergence within the equalizer (pg. 1, paragraphs [0005-006]).

9.   Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh (US Patent 6,011,813) as applied to claim 17 above, in view of Nedic et al. (US Patent 6,563,841 B1).

As noted above, Ghosh discloses all limitations of claim 17, above. Furthermore as noted Ghosh discloses the equalizer with least mean square adaptation (col. 6, lines 4-25) to provide continuous time adaptation for a communication channel.

Ghosh does not teach the equalizer a fractionally-spaced transversal filter with decision feedback and a least mean square-based adaptation and to provide a continuous time adaptation.

However, Nedic et al. teaches in Fig. 6, a fractionally-spaced transversal filter with decision feedback (col. 10, line 57-col. 11, line 21) and a least mean square-based adaptation (col. 10, lines 3-7) to provide a continuous time adaptation.

It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the teachings of Nedic et al. as an improved method of adaptively compensating for time variations in the communication channel (col. 3, lines 43-51).

Allowable Subject Matter

10.   Claims 1-16 are allowed.

11.   The following is a statement of reasons for the indication of allowable subject matter:

The instant application discloses an equalizer. A search of prior art records has failed to teach or

suggest, alone or in combination an equalizer comprising:

" a feedforward filter adapted to receive a first input signal and provide a first output

signal; an adaptive coefficient generator adapted to receive the first input signal and a second

signal and provide tap coefficients to the feedforward filter; a slicer adapted to receive a slicer

input signal and provide a slicer output signal; a slicer timing alignment block adapted to receive

the slicer input signal and provide a second output signal, wherein the slicer output signal is

subtracted from the second output signal to generate an error signal; a tap timing alignment block

adapted to receive the slicer output signal and provide a third output signal; a first low pass filter

adapted to receive the third output signal and the error signal and provide a fourth output signal,

wherein the fourth output signal is multiplied with the third output signal to provide a feedback

signal which is added to the first output signal to generate the slicer input signal; and a second

low pass filter adapted to receive the error signal and provide a mean square error signal" as

disclosed in claim 1.

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

        a.) Jayaraman et al. discloses in US Patent 7,046,726 B2 Method and Apparatus For

Hybrid Decision Feedback Equalization.

b.) Jayaraman et al. discloses in US Patent 7,035,329 B2 Soft Slicer In a Hybrid Decision

Feedback Equalizer.

c.) Phanse et al. discloses in US Patent 7,016,406 B1 Adaptation Structure and Methods

For Analog Continuous Time Equalizers.

d.) Shanbhag et al. discloses in US Patent 7,039,104 B2 Adaptive Coefficient Signal

Generator For Adaptive Signal Equalizers with Fractionally-Spaced Feedback.

e.) Shanbhag et al. discloses in US Patent 6,940,898 B2 Adaptive Coefficient Signal

Generator For Adaptive Signal Equalizers with Fractionally-Spaced Feedback.

f.) Shanbhag et al. discloses in US 2006/0104342 A1 Adaptive Coefficient Signal

Generator For Adaptive Signal Equalizers with Fractionally-Spaced Feedback.

g.) Chen et al. discloses in US 2006/0034614 A1 Adaptive Optical Equalization For

Chromatic And/Or Polarization Mode Dispersion Compensation And Joint Opto-Electronic
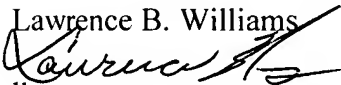
Equalizer Architecture.

13.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037.

The examiner can normally be reached on Monday-Friday (8:00-6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

lbw

April 13, 2007

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER